

are certain light gases which, although nearly absent from the surface of the ground, prevail in the upper strata. What is the composition of the air at different elevations?

(5) We know that an intense ionization is produced by the solar rays and is extinguished in the upper atmospheric strata. What are the consequences of this phenomenon? Is the key to the storms to be found in it?

(6) At the same time the solar radiation appears to us as manifestly the direct cause of all the phenomena. Its study imposes itself upon us as the surest means of determining the true nature of our sun. Is it a variable star? Is it continually decreasing? These questions are of the first importance for the very existence of our planet.

From a nearer point of view, is it not evident that if we knew certainly the laws of this complex radiation, and the manner in which it acts upon our atmosphere, we could deduce from this the weather conditions at a certain fixed time? And this assuredly is the real problem of meteorology.¹

There is plenty of work for everyone, my dear colleagues. Each of us should do his best on the problems which interest him most and should make every effort to maintain for the Meteorological Society of France the high reputation which it has acquired during the first fifty years of its existence.

METEOROLOGY AT WILLIAMS COLLEGE, MASSACHUSETTS.

Mr. Willis I. Milham, Director of the Field Memorial Observatory, Williams College, Williamstown, Mass., states that observations have been taken at that place since 1816. The records for the first twenty-two years and the last twenty years are in good condition, but those for the other years are either missing or very imperfect. Systematic instruction in meteorology is also given in the college. Last year lectures on this subject were given for three weeks in connection with the course on descriptive astronomy. This year there will be a half-year course, three times a week, on meteorology and eight or ten men will elect this course, which it is hoped will become a permanent feature.

IS THERE A SEVEN-YEAR CYCLE IN RAINFALL IN ILLINOIS?

In the Tenth Report of the State Entomologist of the State of Illinois, or the Fifth Annual Report of Dr. Cyrus Thomas, dated December 30, 1880, and printed in the Transactions of the Department of Agriculture of the State of Illinois for the year 1880, Dr. Thomas has an extensive article (pp. 47-59), on the relation of meteorological conditions to insect development. By combining the records from stations in Illinois and neighboring portions of Iowa and Missouri, beginning with the record at Athens in 1840 and including Augusta, Chicago, Dubuque, St. Louis, and other stations not mentioned, but rejecting Cairo and the early records at Sandwich, Dr. Thomas compiled a table and diagrams giving the monthly and annual total rainfall and average temperature, both of which showed systematic cycles of seven years each.

¹ If the complex radiation from the sun has any variations in its complexity or its intensity, these will probably exert corresponding influences on the earth's atmosphere and the weather experienced at any station. Now we observe that our weather is extremely variable, from hour to hour and day to day, without any accompanying appreciable variation in the solar radiation. It is, therefore, evident that our weather conditions at any moment are subject to a large range of variability due to changes in our own atmospheric conditions occurring under the influence of a constant solar radiation. We have not yet been able to explain the character and extent of these variations, but there is every evidence that they are the mechanical and physical phenomena proper to the earth's atmosphere itself. We are not yet in a position that warrants us to believe that if we knew the variations in the solar radiation we could deduce or predict weather conditions any better than when the radiation is uniform and constant.—C. A.

We do not know the method adopted in compiling these tables of averages. The published Table, 3, Average Monthly Rainfall of Illinois for 1854-1877, would be very valuable for climatological study if we could feel sure that each figure represents the average for the whole State, computed by a uniform method throughout the table. But from the fact that Dr. Thomas mentions that for the year 1872 he had only the record for one doubtful station, we infer that all of his averages are formed by combining whatever stations were available without taking account of certain principles recognized by modern climatology. As these principles are liable to be neglected by other students, we recapitulate them as follows:

1.—When several stations have records for different groups of years and are to be combined together into one general average of many years, we must eliminate the differences between the records, depending on the differences in the exposure of the gages and in the kinds of gages, as also those depending upon the distances of the stations from each other and also those depending on the monthly and annual irregularities in rainfall.

2.—The effects of exposure and location at the same locality can ordinarily be best determined by comparing records taken at the same time at the two stations or gages.

3.—If several stations are combined in order to form a mean for any one month or year, then those same stations must appear in every other monthly or annual mean that is to be compared with the former, in order to eliminate chronological variations. In order to secure monthly or annual means for this latter purpose, when no observed record is at hand, one must interpolate geographically between neighboring stations. In this way every monthly mean becomes comparable with the others because it depends upon the same stations. Thus, also, the general averages for different parts of a State will depend upon the same fundamental period of years.

4.—In general, it is most convenient to reduce each observed monthly and annual value to ratios or statements of percentages, adopting the average annual rainfall as the divisor.

It is only when we have many stations thus corrected for chronological and geographic irregularities that we are properly prepared to begin the search for cycles or other systematic changes. The values for successive years, as published in Dr. Thomas's table, are not sufficiently homogeneous to allow of basing on them any study into secular periodicity of precipitation.

WEATHER BUREAU MEN AS INSTRUCTORS.

Mr. C. F. von Herrmann, Section Director, Raleigh, N. C., has been detailed by order of the Chief of Bureau to respond to the request for instruction in meteorology at the Agricultural and Mechanical College at West Raleigh. According to the preliminary schedule forwarded by Mr. von Herrmann, the senior class will receive a full course of instruction, using Waldo's Elementary Meteorology as the basis. The recitations will occupy one hour each week during the college term of thirty-six weeks. An additional course of lectures will also be delivered covering the following topics:

1. The atmosphere: Composition, density, arrangement, physical properties, etc.
2. The temperature of the atmosphere.
3. The temperature of the atmosphere with reference to the climates of the earth.
4. The pressure of the air.
5. The moisture of the air, its condensation into frost, dew, fog, clouds, etc.
6. Precipitation.
7. Winds and the general circulation.

8. Weather: Cyclones and anticyclones.
9. Local storms: Thunderstorms, tornadoes, subtropical storms.
10. Climate.
11. The climate of North Carolina.
12. The work of the National Weather Bureau.
13. The history and literature of meteorology.
14. Practical work: Observing, charting data, map study, and forecasting.

It is very desirable that the students be required to do some actual work of observation, reducing the records, and filling up the form used by the Weather Bureau. Instruments should be furnished for this purpose. Every agricultural college should maintain several rain gages and thermometers in different locations so as to study and appreciate the variations of rainfall and temperature that affect the growth of plants and the development of noxious insects, fungi, etc.

Mr. George Reeder, Observer, Fort Worth, Tex., reports that the class in physical geography of the Fort Worth University, under Prof. M. J. Iorns, visited the office September 29 and spent an hour receiving instruction relative to the instruments and methods of the Weather Bureau.

Mr. F. P. Chaffee, Section Director, Montgomery, Ala., reports that, on September 29, he lectured before the students and teachers of the Southern Industrial Institute at Camp Hill (Dr. Lyman Ward, President) on the Weather Bureau and its benefits to the country.

Mr. J. R. Weeks, Observer, Macon, Ga., writes as follows:

I have the honor to respectfully report that I have endeavored during my stay here to educate the public of this vicinity in meteorological matters by lectures and otherwise, at much personal expense and inconvenience. However, it is slow work. * * * A gratifying increase in the use of the daily weather map, for purposes of instruction in the public schools of this section, has been noted during the past two years and the work of this office has considerably increased. To facilitate educational interest in the work, I have recently purchased a stereopticon, prepared a number of slides and purchased others from Doctor Fassig. Educational work is done outside of my regular office hours and duties, which are numerous, as I have no assistant.

All intelligent citizens must heartily sympathize with Mr. Weeks in his struggle to enlighten the public of a State in which an unusual number of so-called weather almanacs, such as Hicks's, Greer's, Dunne's, Gathright's, Ayer's, and others are circulated and where even some of the colleges and influential newspapers apparently indorse the astrological or fakir method of making weather predictions. The daily weather map is printed and published by the Government and distributed quite gratuitously for the purpose of enabling any one to make his own predictions of the coming weather, in case he does not care to rely upon the official predictions of the Weather Bureau. We invite our fellow citizens everywhere, and especially the farmers, to take a more active intelligent view of the daily weather maps. See that they are displayed daily at your nearest post-office; borrow the back numbers and study them. Observe how the weather changes move over the surface of the country and learn to realize that your weather is not controlled by the stars, planets, or signs of the zodiac, but comes to you from some neighboring region just as naturally as a flood rolls down a river valley. Keep a record of the weather at your location and of the long-range predictions of the almanac, and consider whether you will do better to regulate important business transactions by the almanac or by the weather map.

Mr. Charles E. Ashcraft, jr., Assistant Observer in charge of the Weather Bureau station at Cheyenne, Wyo., reports that on September 23 he addressed the senior class of the local high school on the objects and practical working of the United States Weather Bureau.

THE NEW WEATHER BUREAU STATION IN YELLOWSTONE PARK, WYO.

The following extract from memorandum No. 183, October 12, 1903, will interest meteorologists and the public:

As soon as practicable a regular meteorological station of the Weather Bureau will be established at Yellowstone Park, Wyo., of model A, with Mr. John N. Ryker, Observer, in charge. Both a. m. and p. m. observations will be taken.

Temperature and rainfall stations will be established at the Lake, which is about one half day's ride from the Springs, and 7800 feet above sea level. Captain Pitcher, Superintendent of the Park, has offered to have the noncommissioned officer at the Lake take readings and telegraph them daily to the observers at the Springs. The observations taken at the Springs will be put on the circuit. Observations from the Lake will be mailed to Cheyenne.

Observations will be telegraphed from June 1 to September 30, inclusive, and be distributed extensively throughout the circuits, so that they may appear on many maps and bulletins of the Weather Bureau. There will be telegraphed to the observer each morning during the period above mentioned by special message from Chicago, the 8 a. m. and maximum temperatures from 50 stations of the service, so selected as to represent fairly the whole service. The reports from these stations will, by cooperation with the different hotels of the Park, be entered on bulletin boards displayed in the office or veranda of each hotel; the boards to be furnished by the proprietors of the hotels and to be prepared under the supervision of the observer, who will see that they are properly lettered and will request the proprietors to have the data entered thereon each morning. The observer will make a tour of the Park and provide for the prompt and efficient cooperation of the managers of the different hotels in the receipt of these reports and the prompt posting thereof.

The observer may establish voluntary stations at any or all military patrol stations. The readings will be taken in accordance with the orders issued by the Superintendent of the Park.

SUN SPOTS AND WEATHER.

The following telegrams should be noted by all readers of the MONTHLY WEATHER REVIEW and should be disseminated widely, at least in substance:

PHILADELPHIA, PA., November 2, 1903.

To Prof. WILLIS L. MOORE,
Chief U. S. Weather Bureau, Washington, D. C.

Will esteem it a favor if you will telegraph us a communication pointing out the very indefinite relation of great disturbances in the sun and terrestrial storms, which is shown by the fact that the great magnetic disturbances now occurring have no immediate effect on American weather which varies with locality and, over the eastern part of the United States, has been more or less quiescent for some time. A dispatch of this kind seems to me worth while in view of wrong inferences and the confusion of magnetic storms, so called, with weather disturbances.

(Signed) H. M. WATTS.

WASHINGTON, D. C., November 2, 1903.

Mr. H. M. WATTS,
The Press, Philadelphia, Pa.

The exact connection between solar action as registered in outbursts of sun spots and terrestrial magnetic storms is still under investigation, and till that connection is fully understood there is no need to make attempt to state what the relations are between the two sets of phenomena. At present the proof is strong that taking year by year, the change in solar energy from the average is accompanied by similar variations in pressure and temperature. The polar regions of the sun show such turbulent action more than the equatorial, and hence the prominence frequency is a more sensitive index than the sun spots of lower latitudes. What is the connection between an outpouring of solar energy as shown in prominence eruptions, magnetic disturbances, and other symptoms, and the corresponding effect on the circulation of the atmosphere taken as a whole, is a problem which is just being taken up intelligently. At present it is a matter of conjecture rather than of definite knowledge. We therefore prefer to postpone any special opinions on this interesting topic till science has more fully solved the questions at issue. To identify an individual solar spot and a terrestrial cyclone is such crude science as to call for no serious comment, although it is very common for an individual to seek to answer cosmical questions by the state of the sky over his own town.

(Signed) WILLIS L. MOORE,
Chief U. S. Weather Bureau.